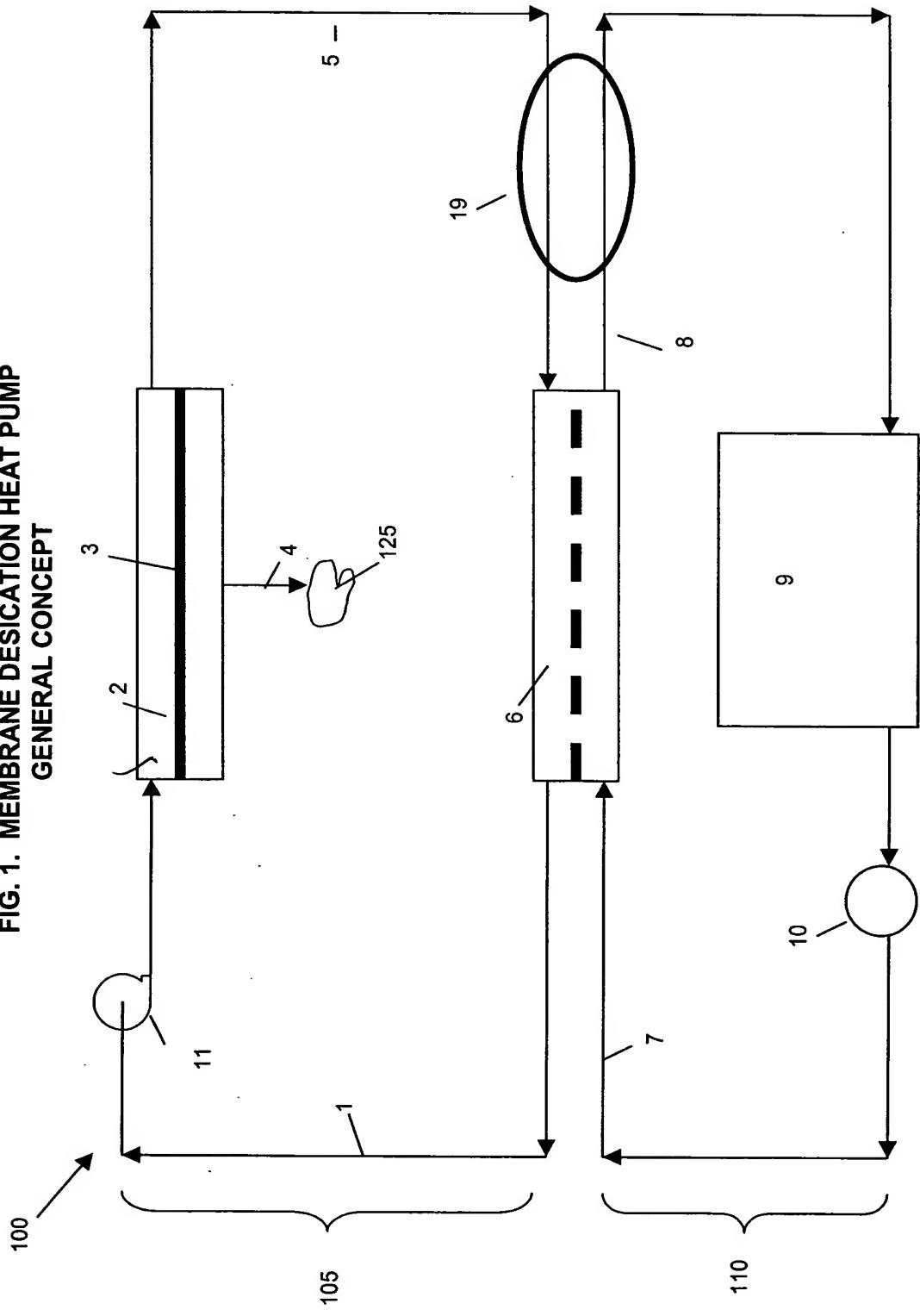
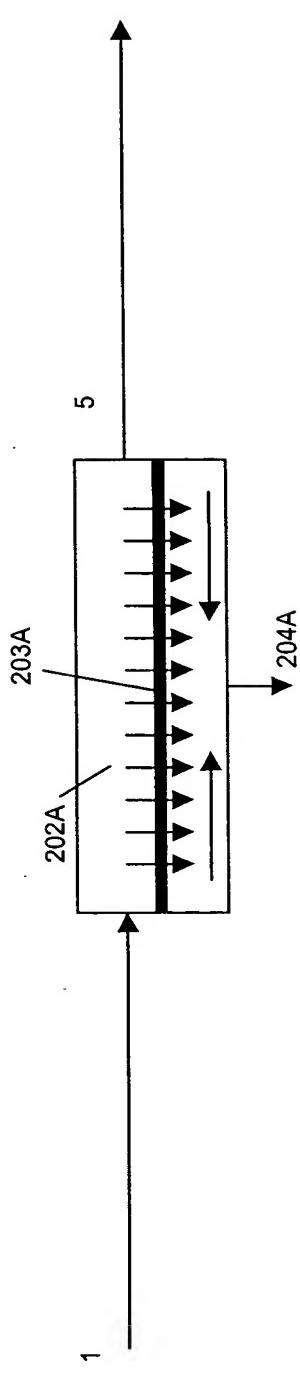


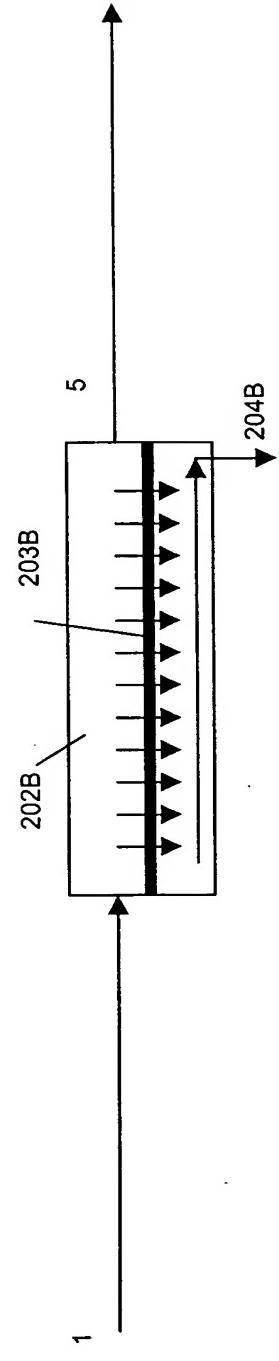
**FIG. 1. MEMBRANE DESICCATION HEAT PUMP  
GENERAL CONCEPT**



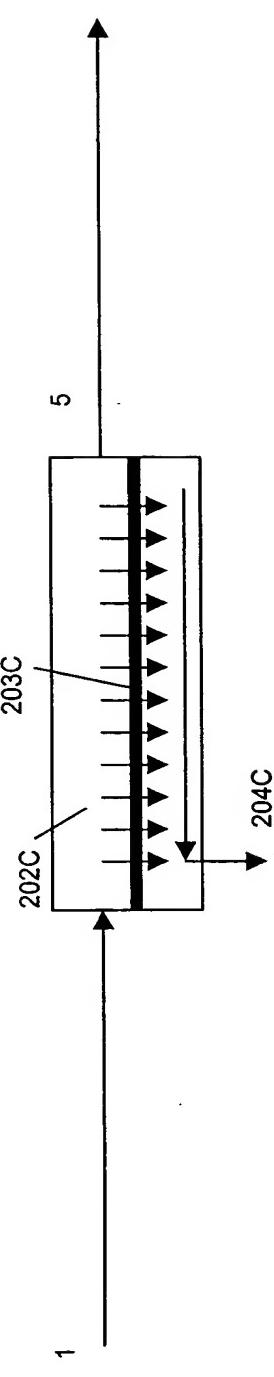
**FIG. 2A. MIXED PERMEATE FLOW**



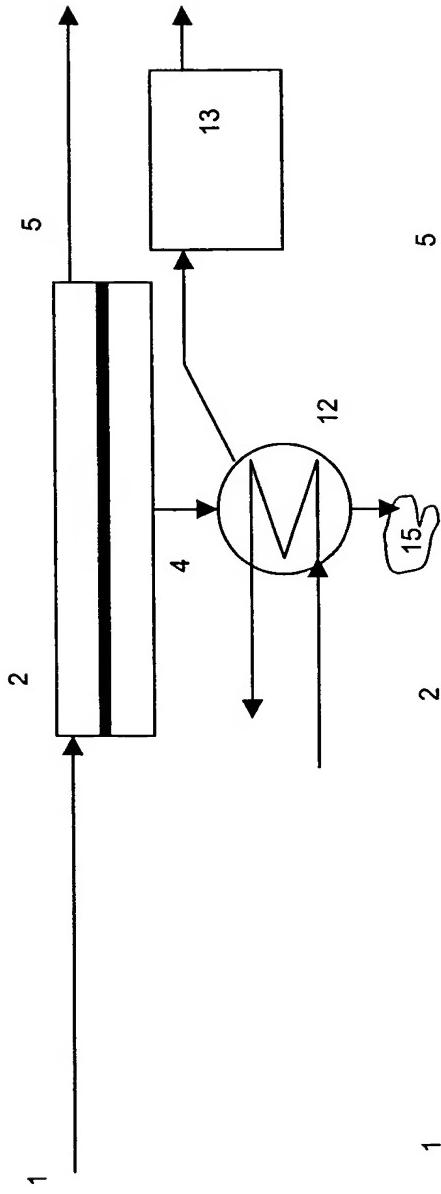
**FIG. 2B. COCURRENT PERMEATE FLOW**



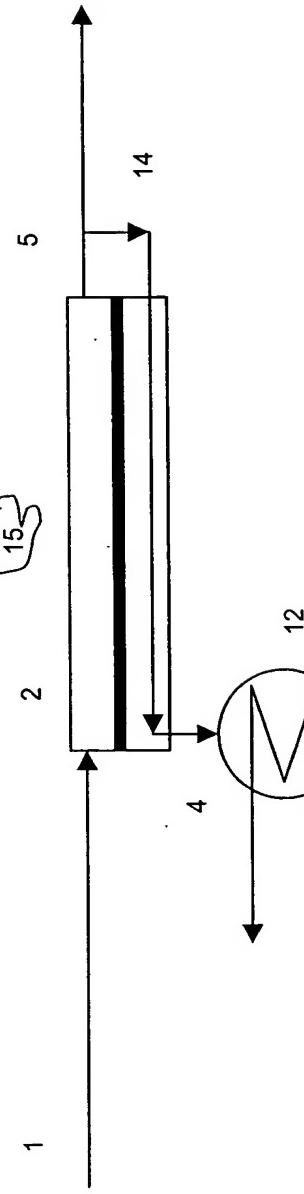
**FIG. 2C. COUNTERCURRENT PERMEATE FLOW**



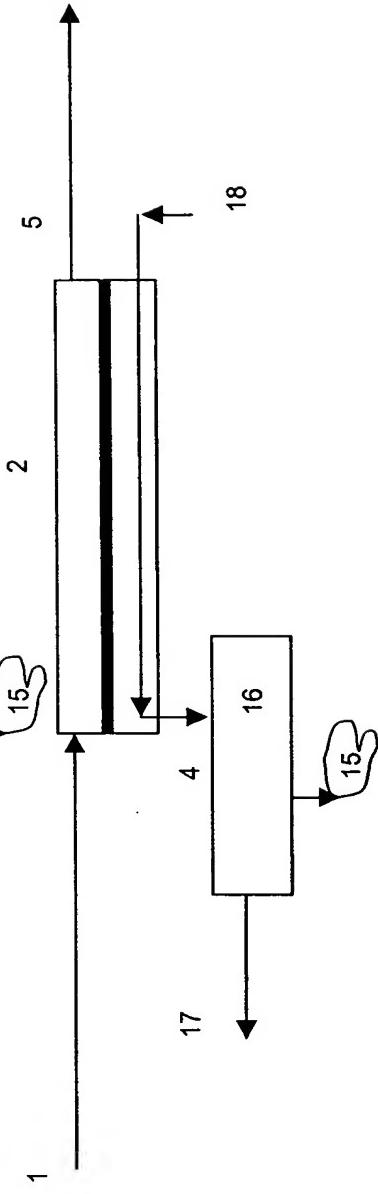
**FIG. 3A**  
**VACUUM**



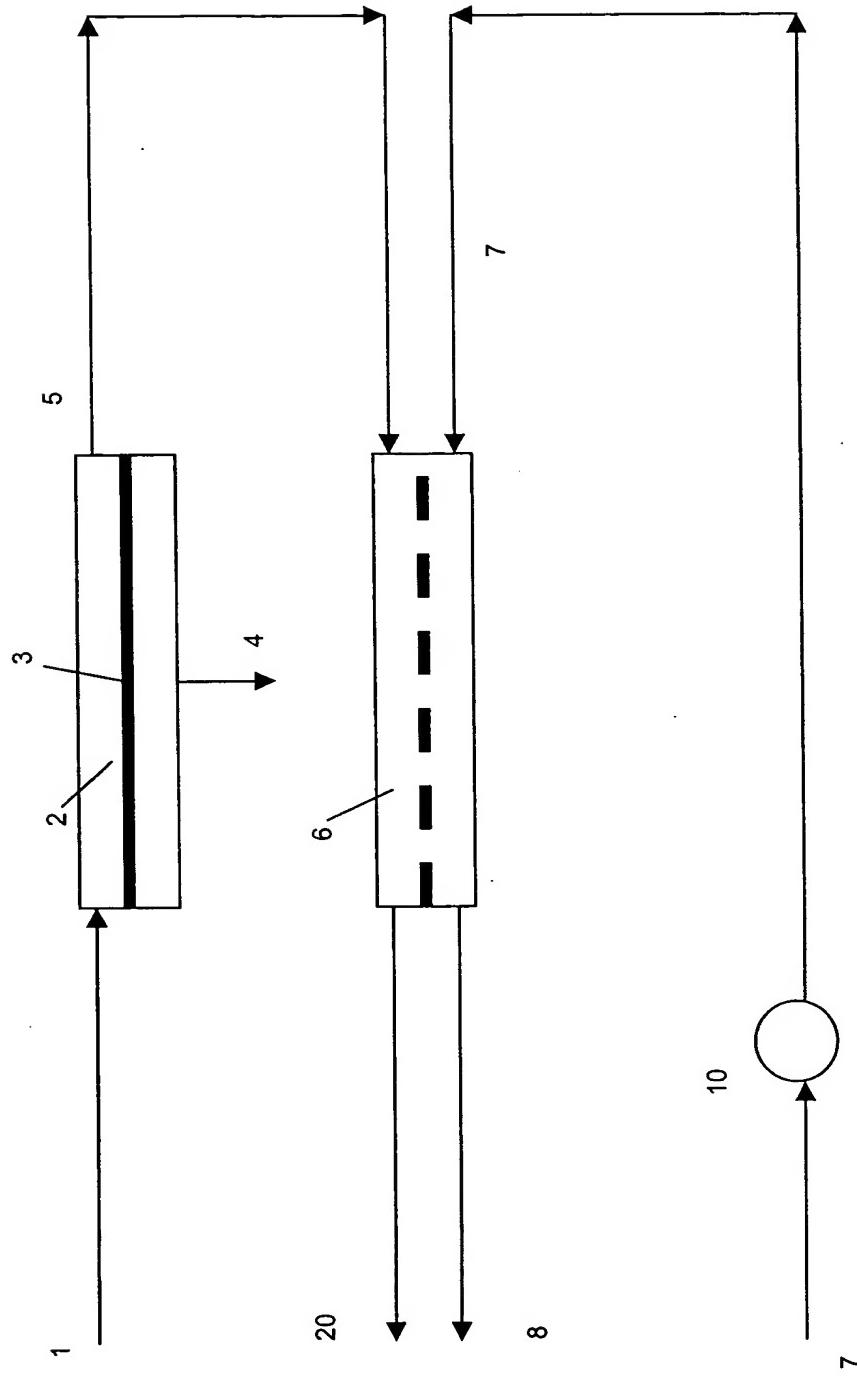
**FIG. 3B**  
**REFLUX**



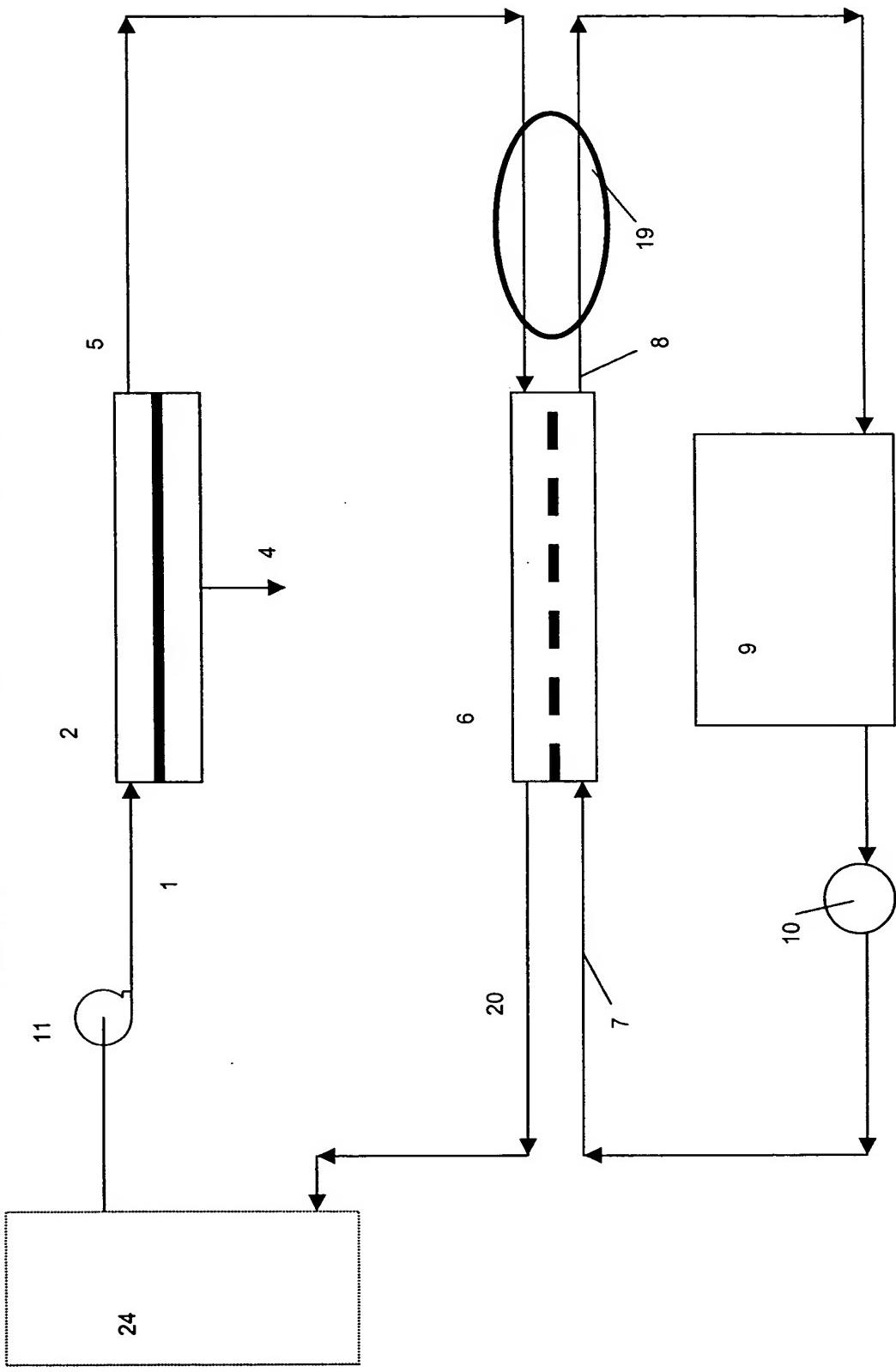
**FIG. 3C**  
**SWEEPING**



**FIG. 4. HEAT PUMP - OPEN CYCLES**



**FIG. 5. OPEN CYCLE GAS CHILLING / AIR CONDITIONING**



**FIG. 6. LIQUID CHILLING - OPEN CYCLE**

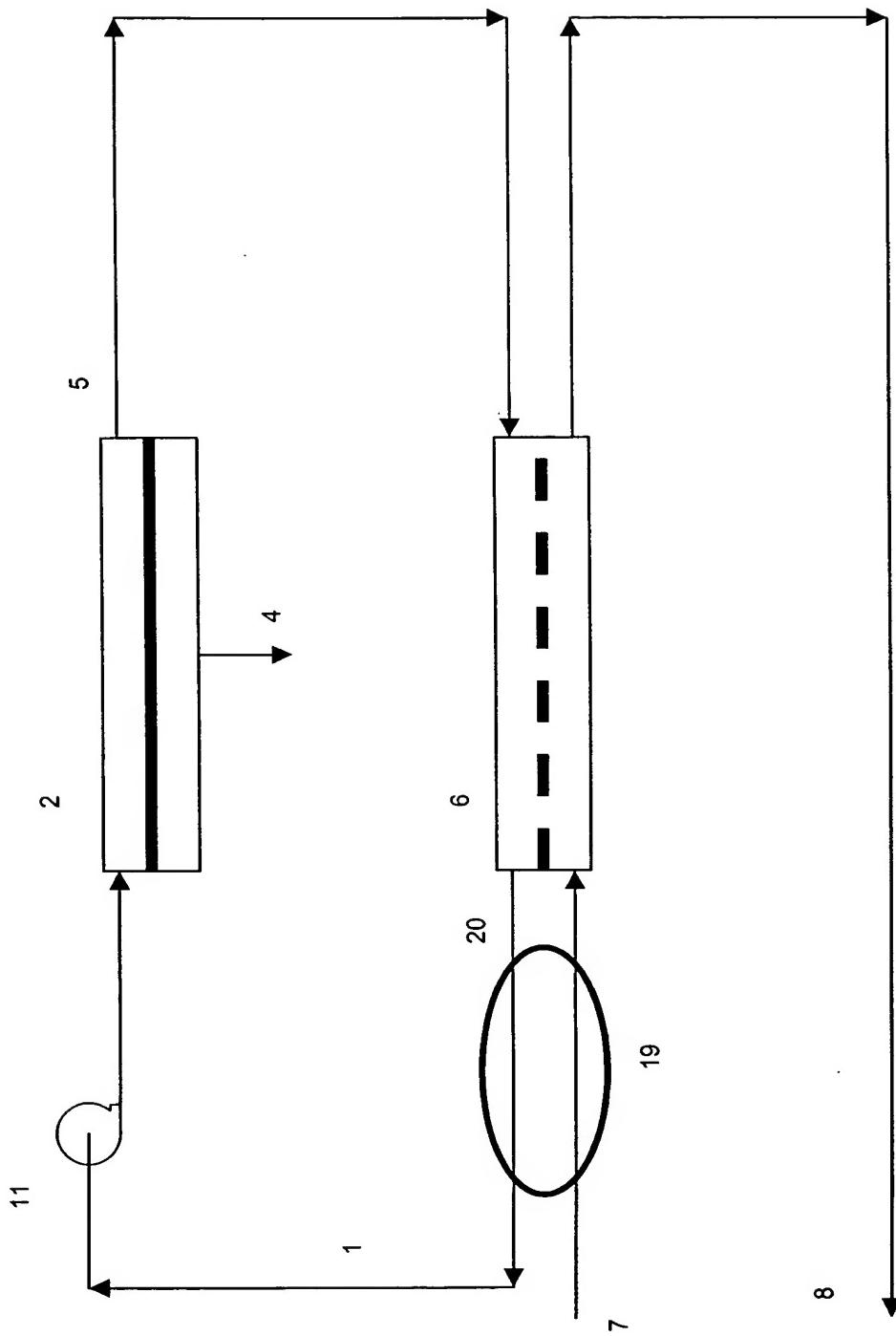
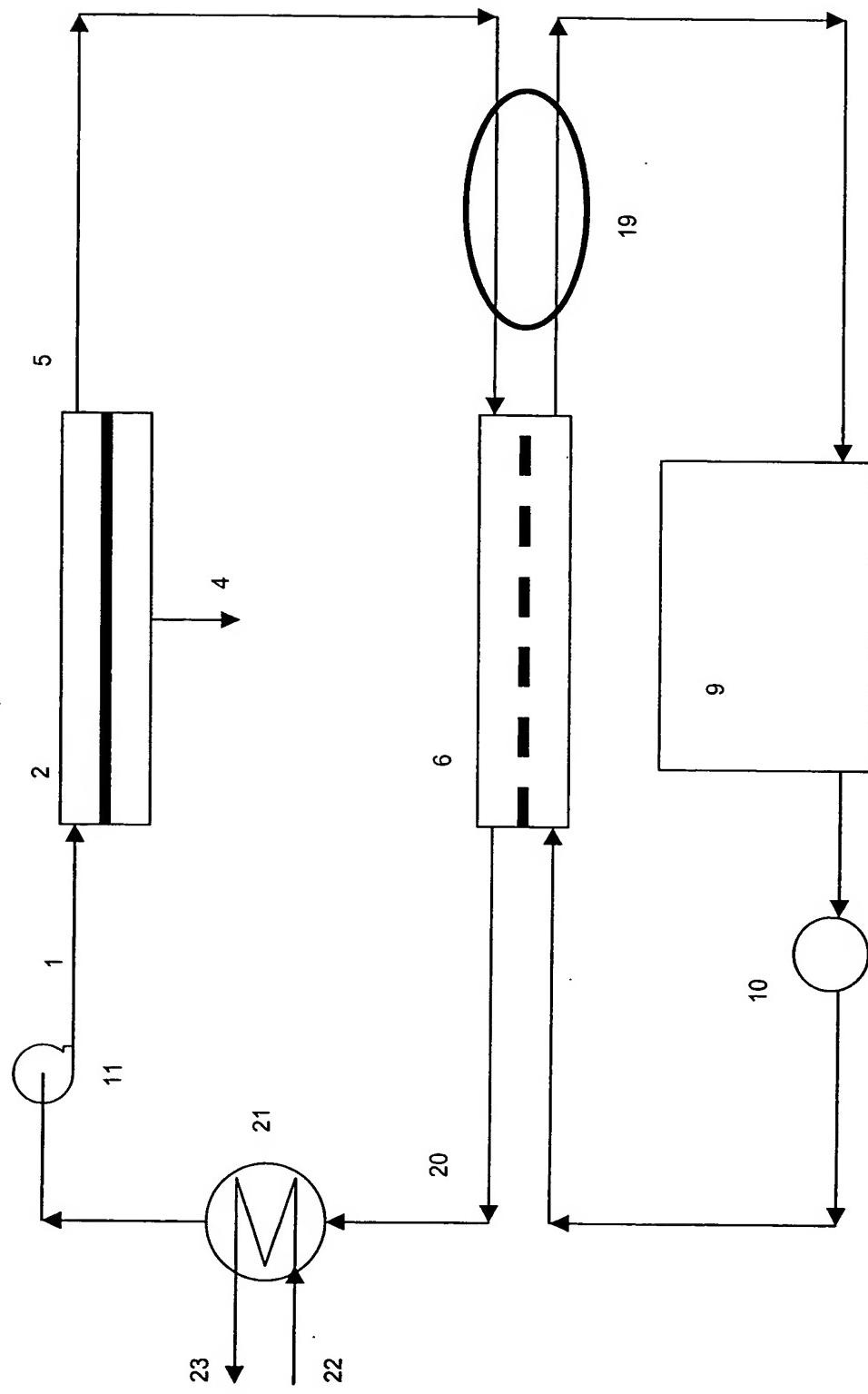


FIG. 7. GAS CHILLING - CLOSED CYCLE



21

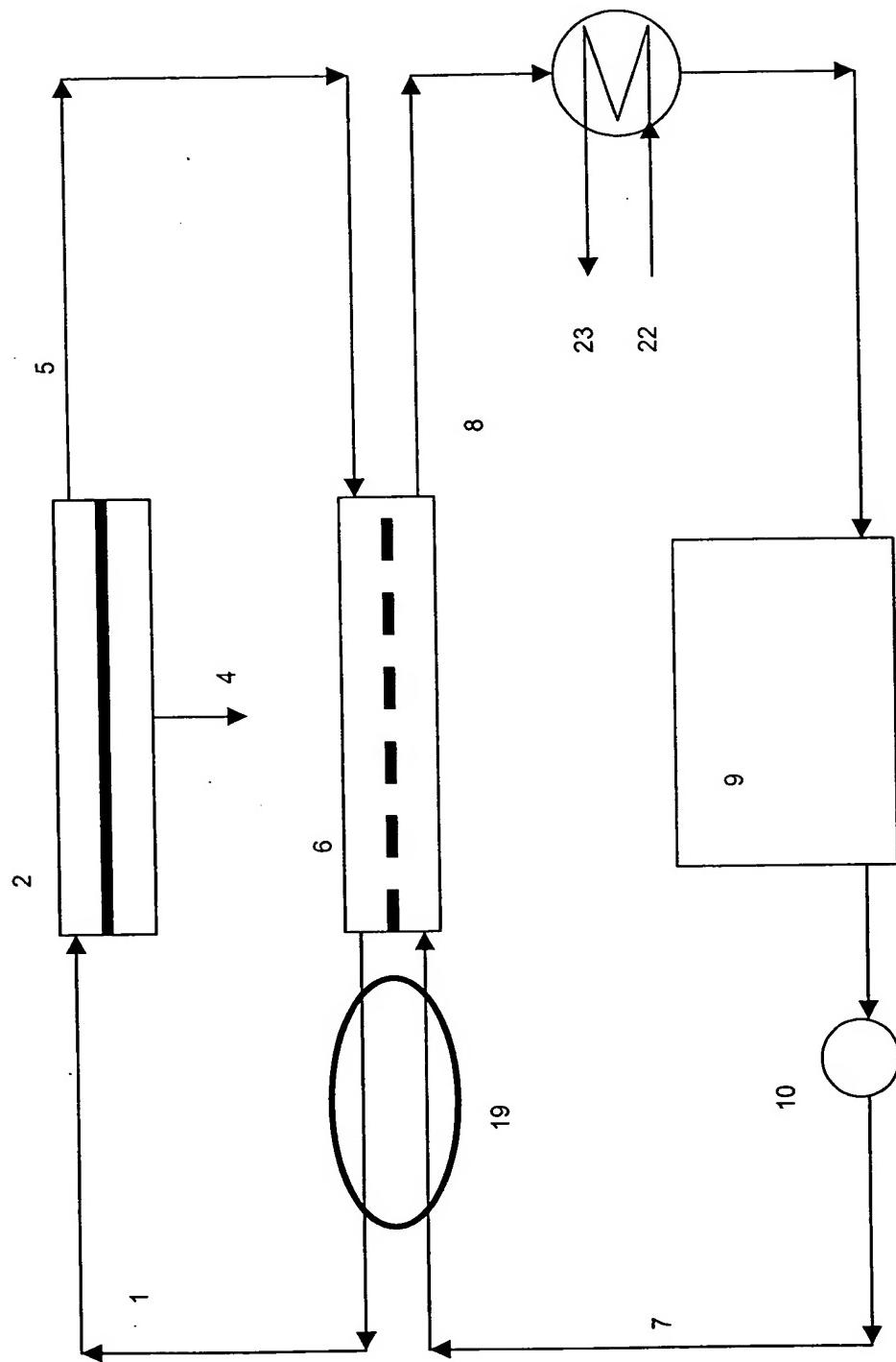


FIG. 8. CLOSED CYCLE LIQUID CHILLING

**FIG. 9. GAS CHILLING/AIR CONDITIONING + VAPOR CONTENT CONTROL**

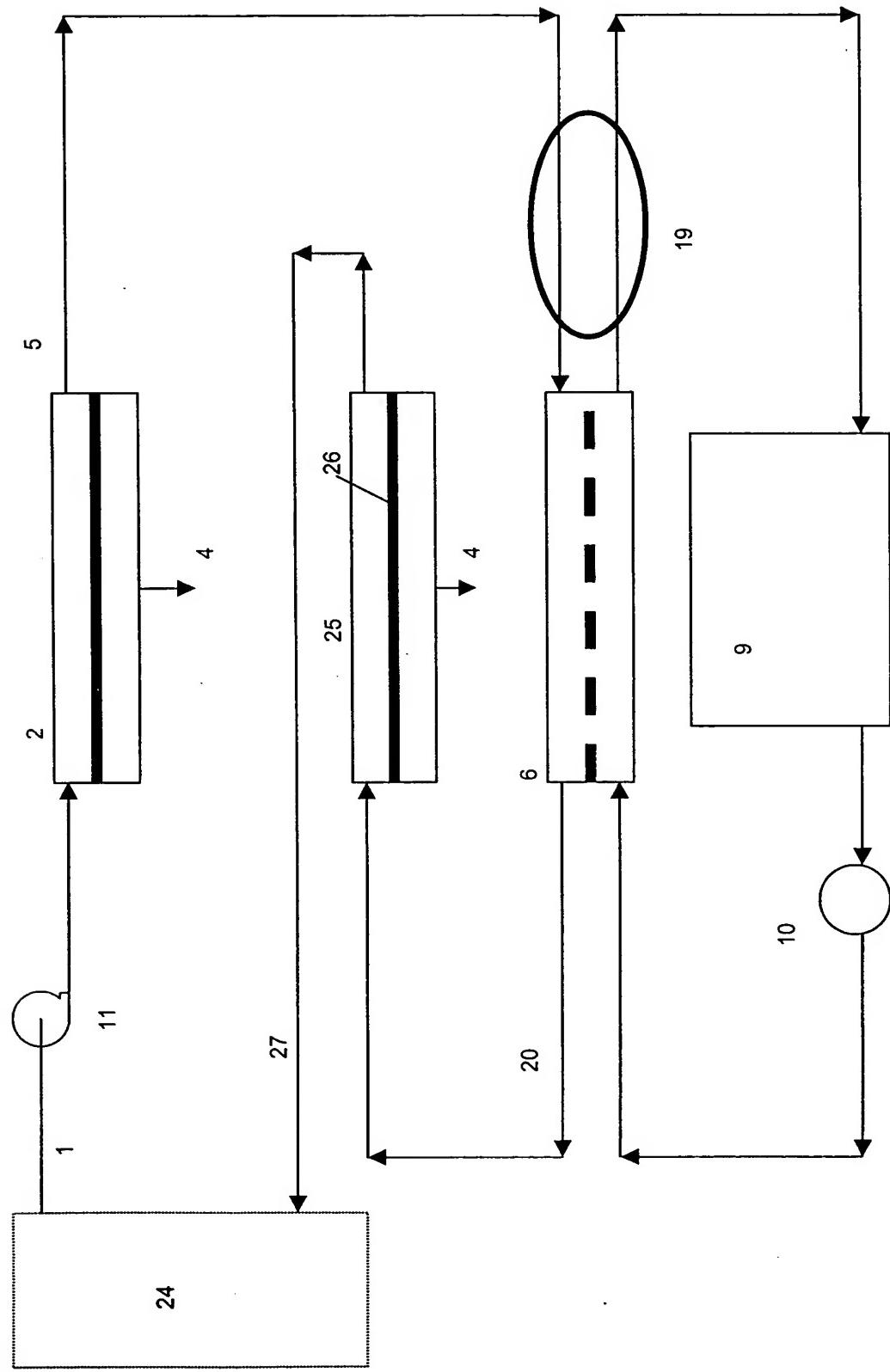


FIG. 10. LIQUID CHILLING - OPEN CYCLE Q IN

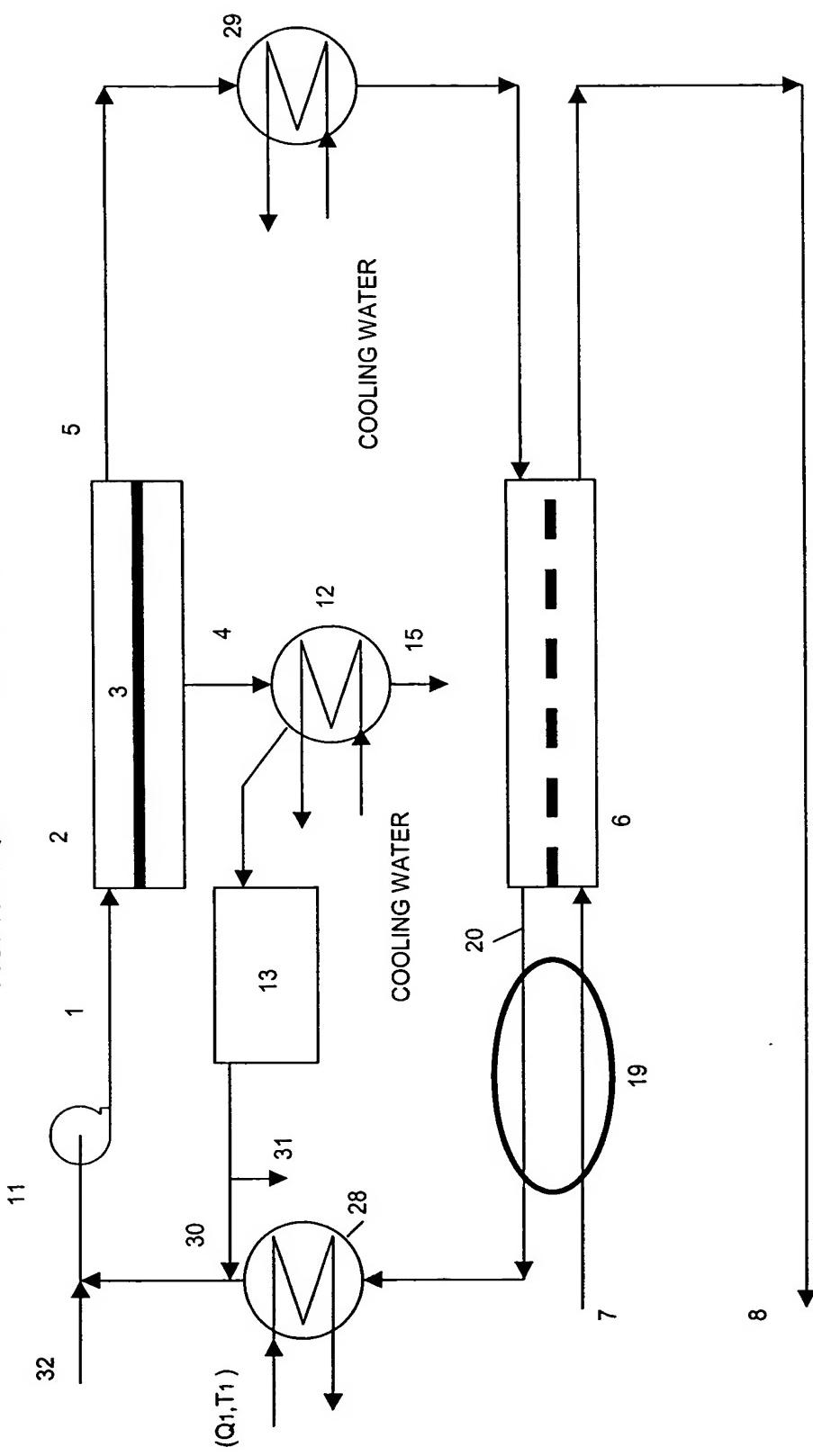


FIG. 11. LIQUID CHILLING - OPEN CYCLE + REFLUX

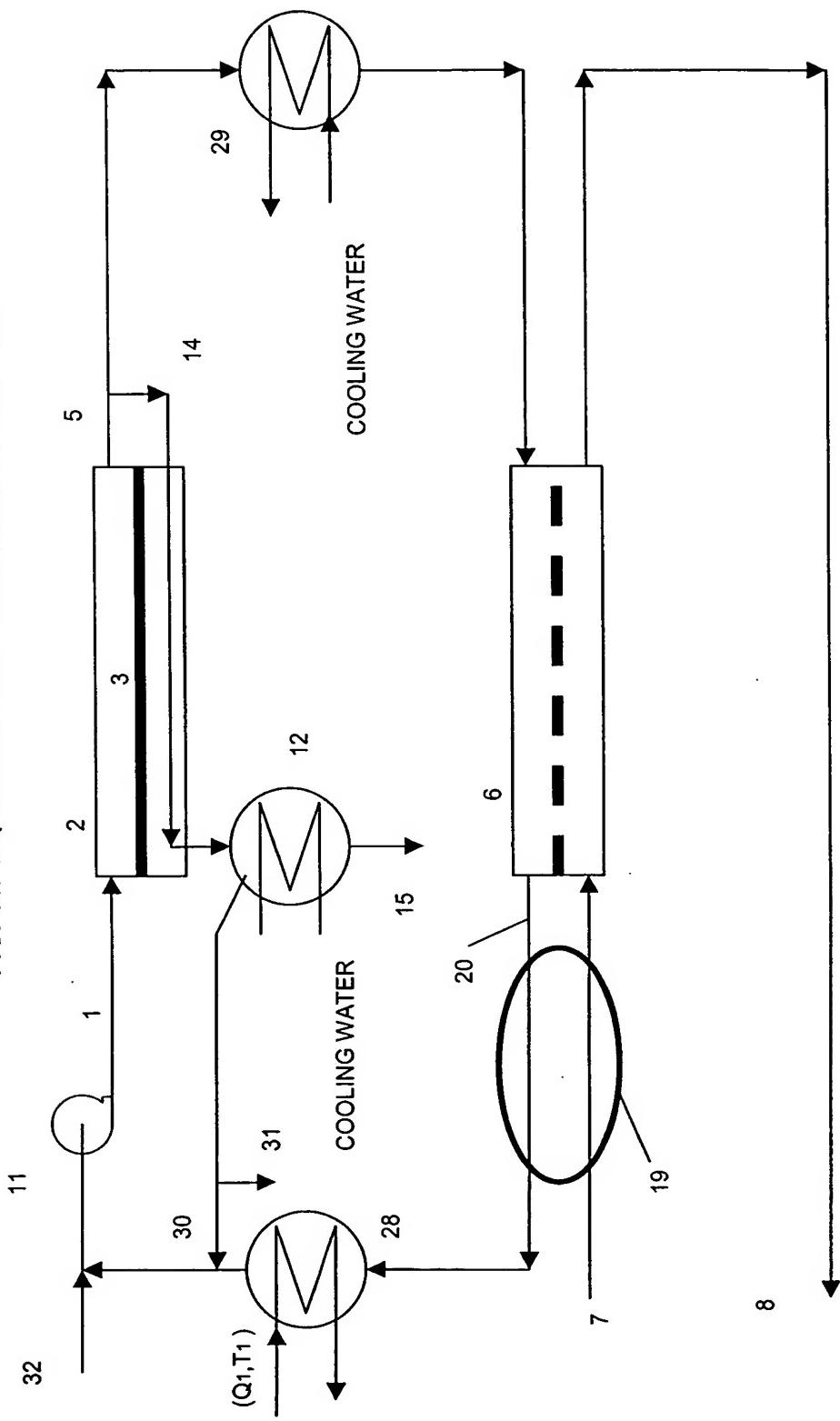
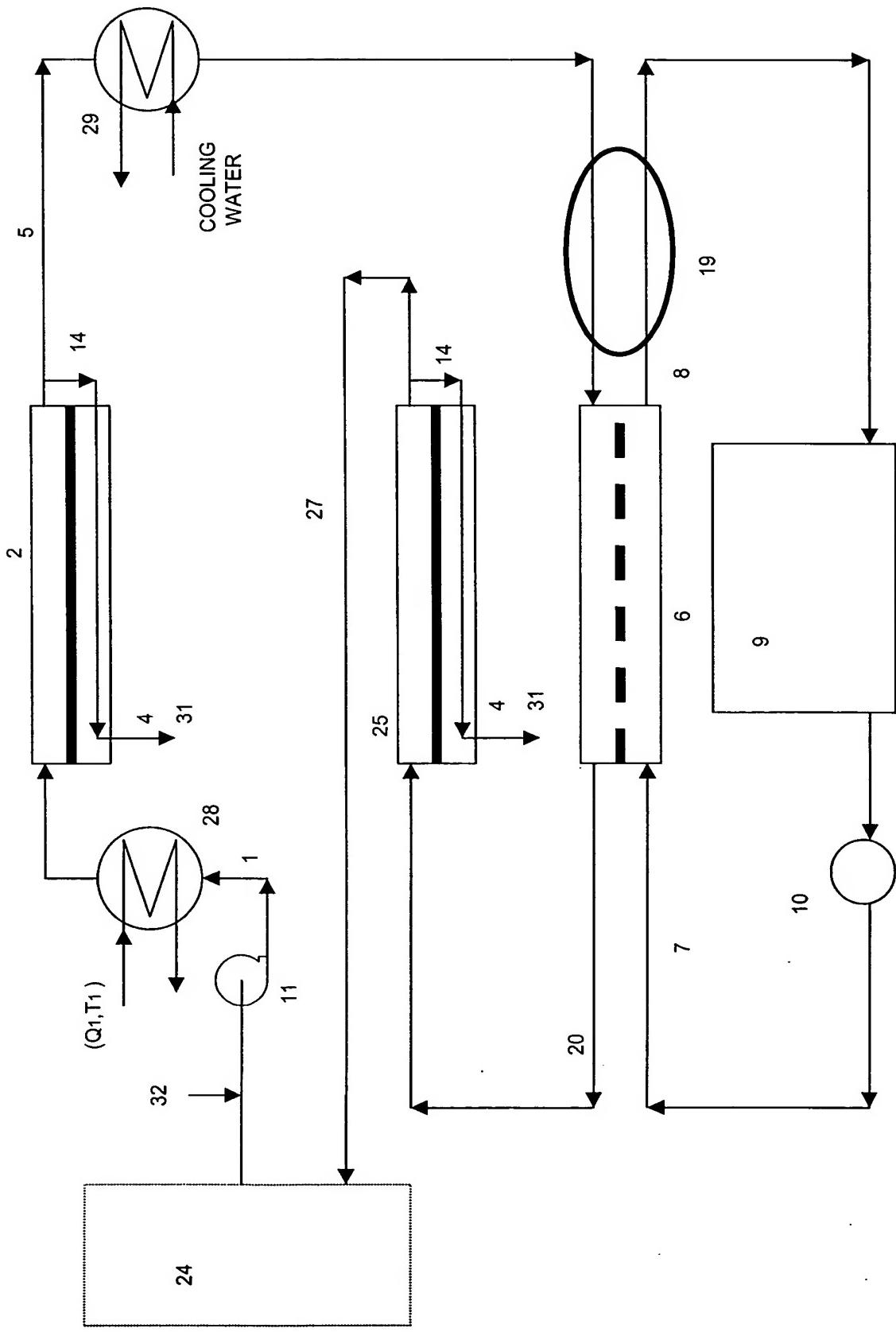
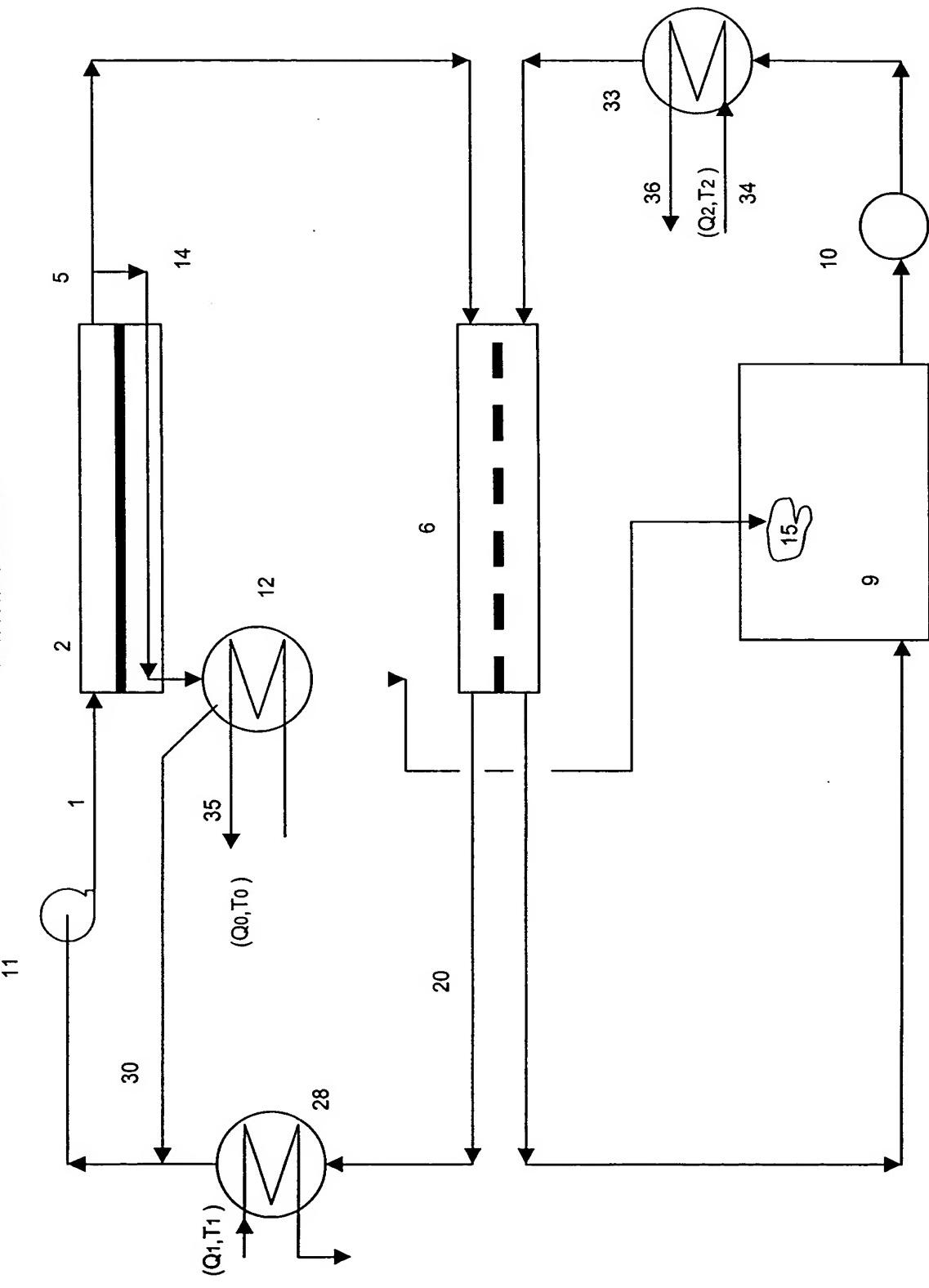


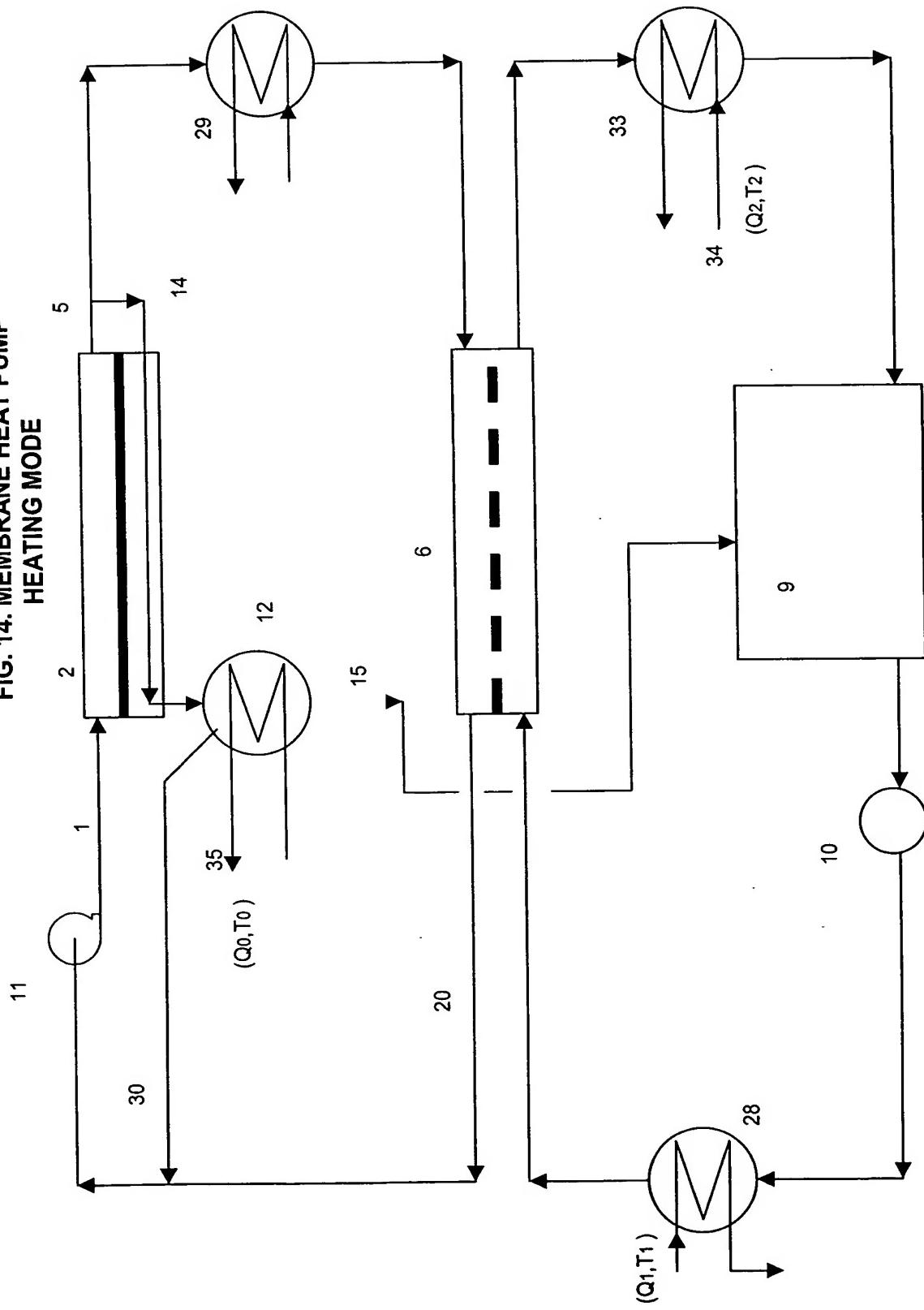
FIG. 12. AIR CONDITIONING - DETAILED



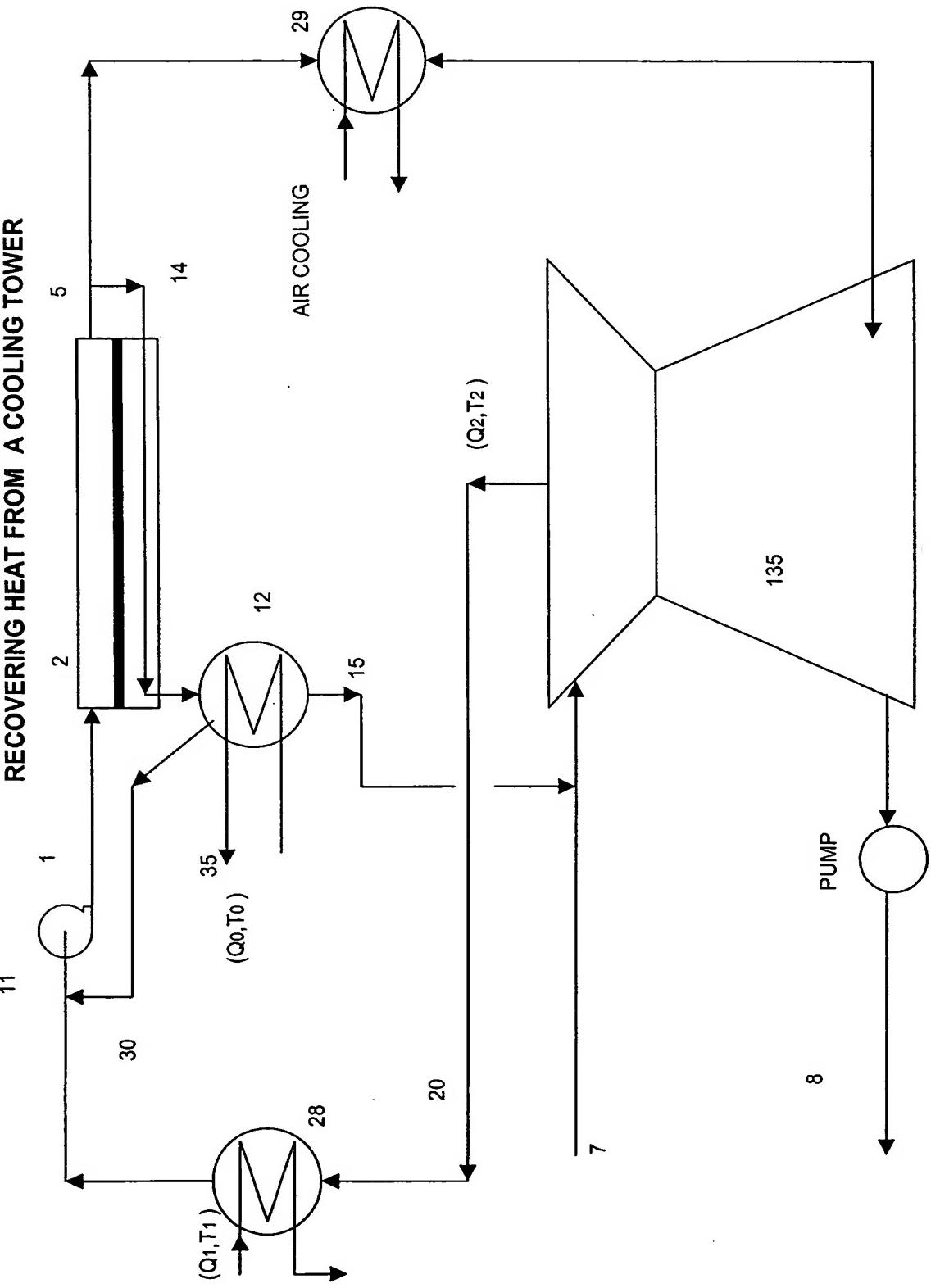
**FIG. 13. MEMBRANE HEAT PUMP  
HEATING MODE**



**FIG. 14. MEMBRANE HEAT PUMP  
HEATING MODE**



**FIG. 15. MEMBRANE HEAT PUMP  
RECOVERING HEAT FROM A COOLING TOWER**



**FIG. 16. MEMBRANE HEAT PUMP  
RECOVERING HEAT FROM A COOLING TOWER**

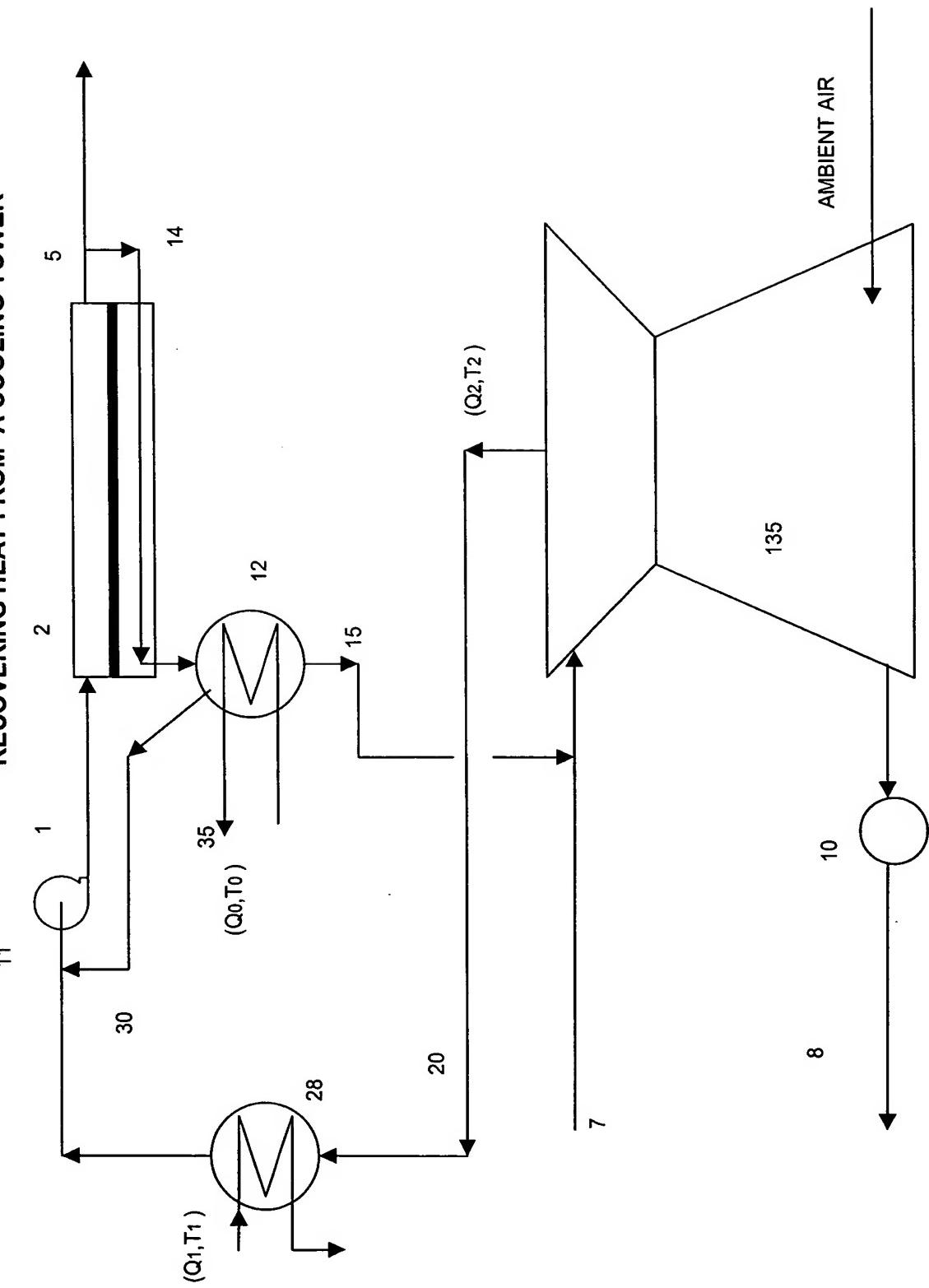


FIG. 17. HEAT PUMP PERFORMANCE  
 $t_2$  HEAT TAKING TEMPERATURE = 40 DEG C

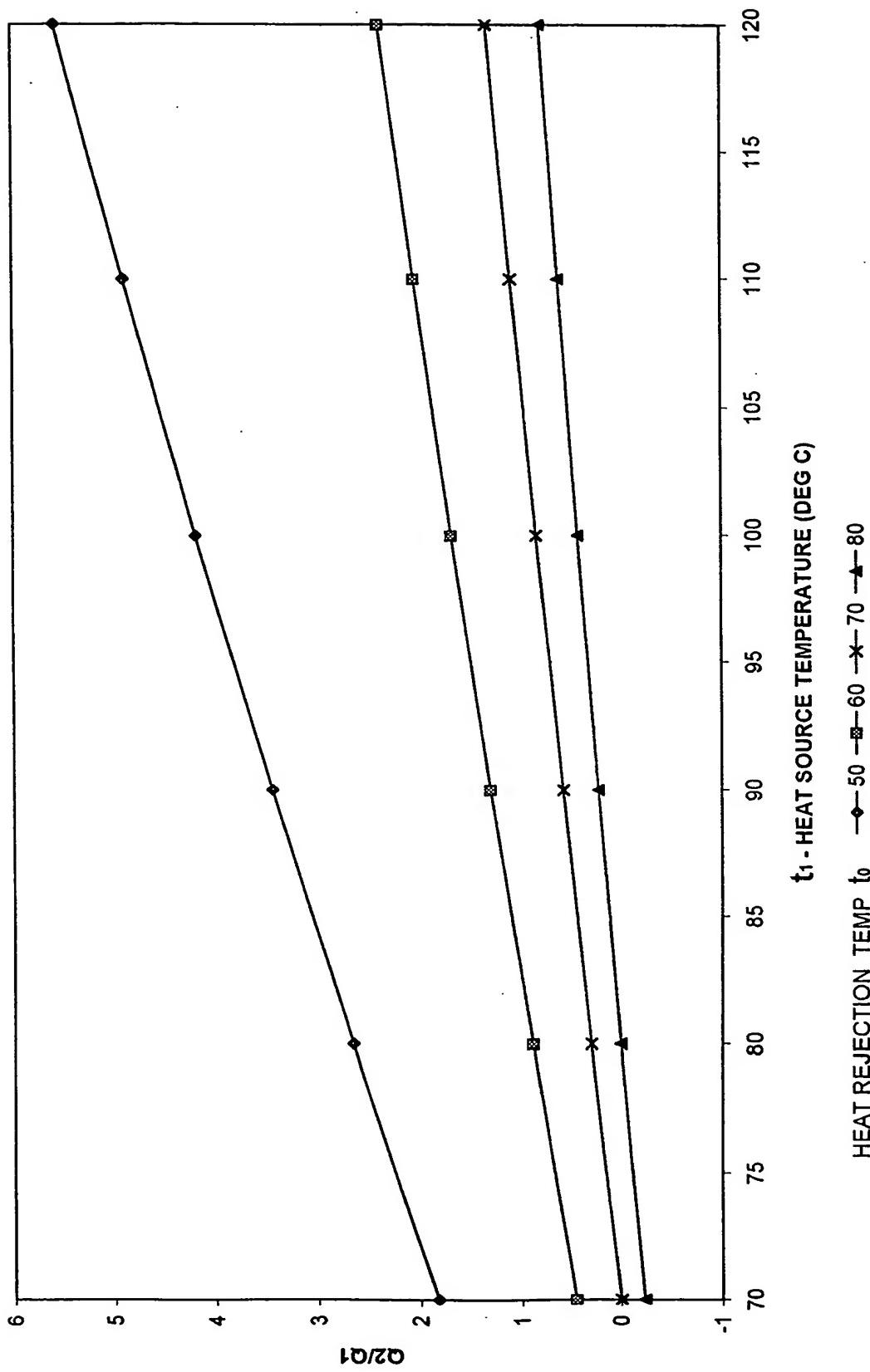
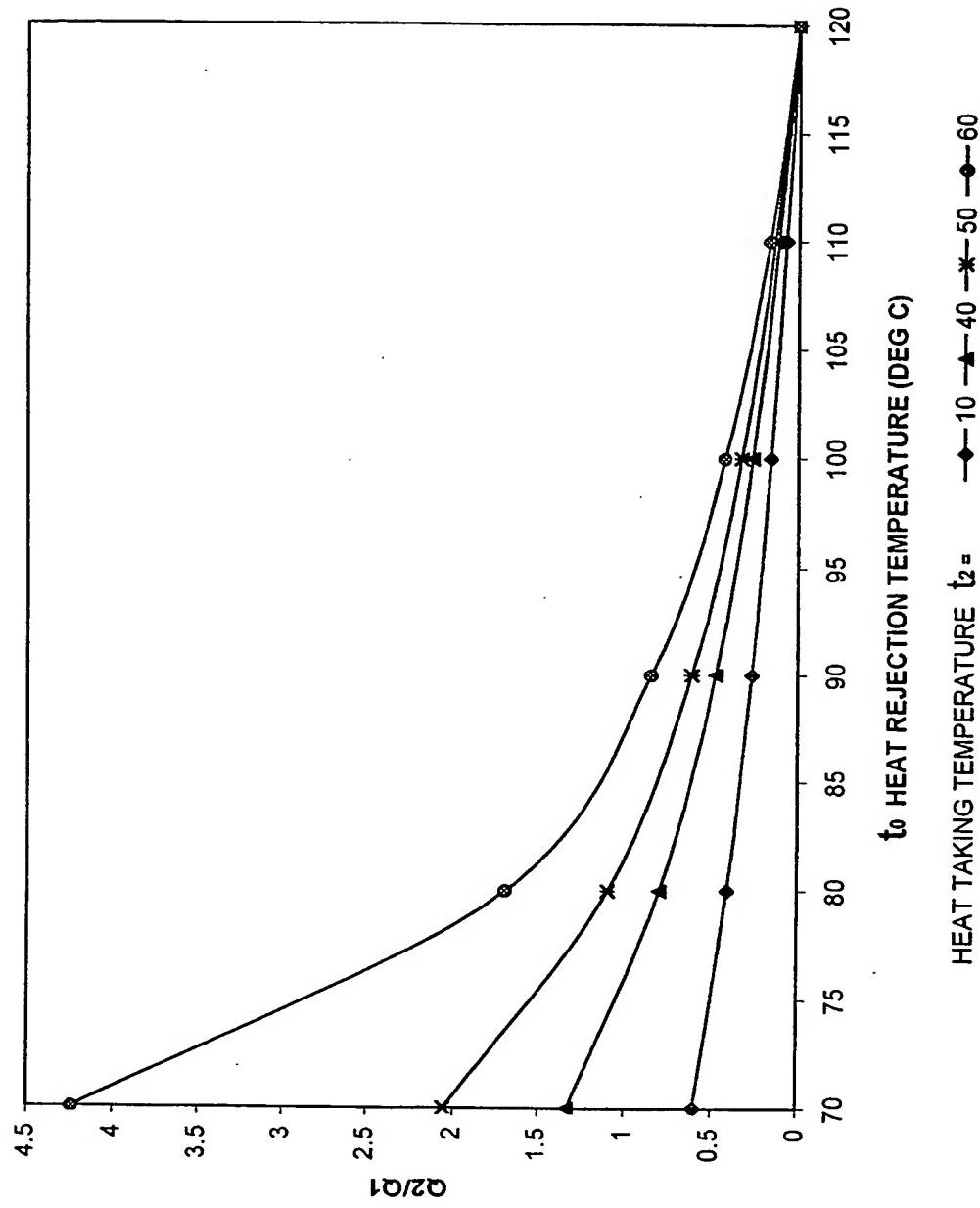
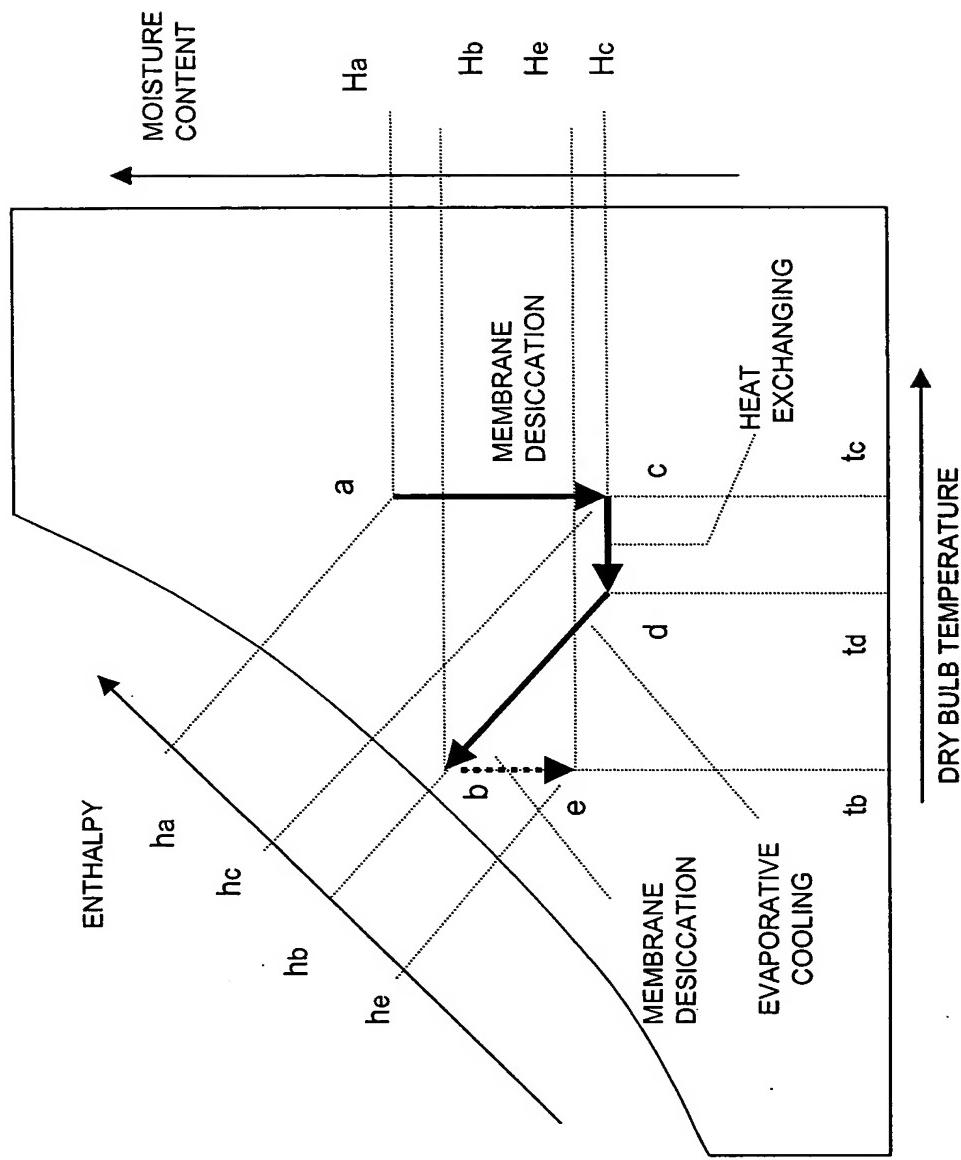


FIG. 18. HEAT PUMP PERFORMANCE  
 $t_1$  HEAT SOURCE TEMPERATURE = 120 DEG C



**FIG. 19. MEMBRANE HEAT PUMP PROCESS  
SHOWN ON A PSYCHOMETRIC CHART**



**FIG. 20. CLOSED AIR CYCLE  
SHOWN ON A PSYCHOMETRIC CHART**

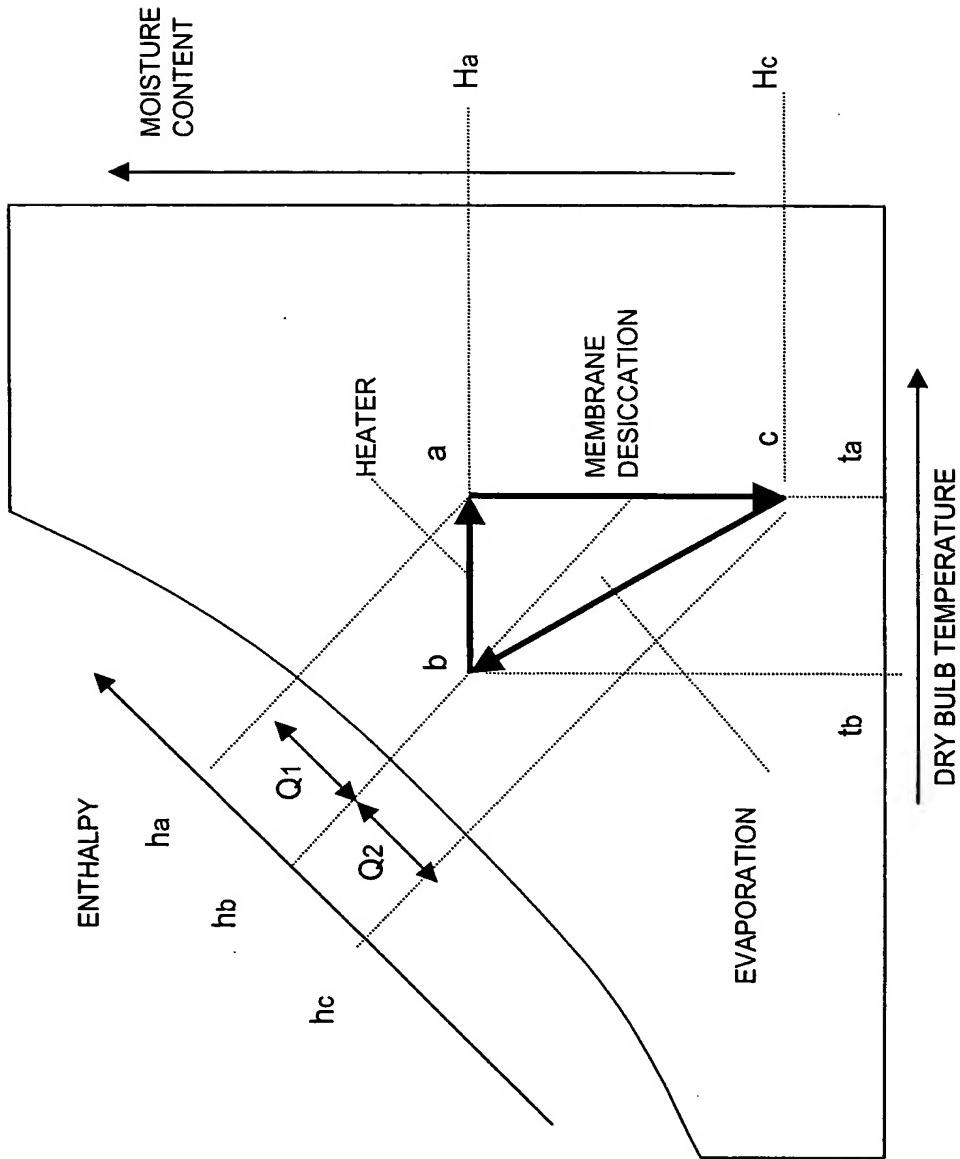


FIG. 22. OPEN CYCLE MEMBRANE HEAT PUMP PROCESS FOR  
WASTE HEAT RECOVERY SHOWN ON A PSYCHOMETRIC CHART

